

## FORAGE SUITABILITY GROUP

### Limy Upland

**FSG No.:** G102AY400SD

**Major Land Resource Area:** 102A - Rolling Till Prairie

#### Physiographic Features

The soils in this group are found on nearly level to strongly convex slopes on glacial till moraines, plains, and valley sides.

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	980	1970
<b>Slope (percent):</b>	2	25
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Low	High

#### Climatic Features

This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 102A. Average annual precipitation for all climate stations listed below is about 23 inches. About 75 percent of that occurs during the months of April through September. On average, there are about 31 days with greater than .1 inches of precipitation during the same timeframe.

Average annual snowfall ranges from 36 inches at Britton to 48 inches at Tracy. Snow cover at depths greater than 1 inch range from 56 days at Milbank to 105 days at Morris.

Average July temperatures are about 72°F and average January temperatures are about 11°F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -40 at Brookings and a high of 108 recorded at both Britton and Milbank. The MLRA lies in USDA Plant Hardiness Zones 4a and 4b.

Average annual wind speeds range from about 8 mph in the eastern part of the MLRA to about 11 mph in the west. The highest wind speeds occur during March through May. It is cloudy about 154 days a year in the west and 166 days in the east. Average morning relative humidity in June is about 86 percent and average afternoon humidity is 59 percent.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data, access the National Water and Climate Center at <http://www.wcc.nrcs.usda.gov>.

	<b>From</b>	<b>To</b>
<b>Freeze-free period (28 deg)(days):</b> (9 years in 10 at least)	127	145
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)	May 22	May 11
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)	May 31	May 17

	<b>From</b>	<b>To</b>
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)	Sep 08	Sep 19
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)	Sep 17	Sep 26
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	109	134
<b>Growing Degree Days (40 deg):</b>	4066	4515
<b>Growing Degree Days (50 deg):</b>	2441	2698
<b>Annual Minimum Temperature:</b>	-30	-20
<b>Mean annual precipitation (inches):</b>	19	26

**Monthly precipitation (inches) and temperature (F):**

<b>2 years in 10:</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
Precip. Less Than	0.13	0.19	0.28	0.66	1.29	1.83	1.54	0.91	0.68	0.45	0.17	0.10
Precip. More Than	0.97	1.08	2.70	3.68	4.83	4.92	5.21	3.75	4.63	3.32	2.19	1.19
<b>Monthly Average:</b>	0.54	0.59	1.37	2.20	2.88	3.67	3.21	2.77	2.32	1.83	0.96	0.54
<b>Temp. Min.</b>	-2.8	3.1	17.6	32.8	44.6	54.6	59.3	56.2	45.7	34.2	20.5	4.6
<b>Temp. Max.</b>	21.4	26.5	39.3	56.5	70.4	80.5	85.5	82.9	73.2	61.0	42.0	26.6
<b>Temp. Avg.</b>	10.1	15.9	29.0	44.6	57.2	66.8	72.0	69.5	59.3	47.5	30.8	15.6

<b><u>Climate Station</u></b>	<b><u>Location</u></b>	<b><u>From</u></b>	<b><u>To</u></b>
SD1049	Britton, SD	1961	1990
SD1076	Brookings, SD	1961	1990
SD1739	Clark, SD	1961	1990
SD1777	Clear Lake, SD	1961	1990
SD5536	Milbank, SD	1961	1990
MN5400	Milan, MN	1961	1990
MN5638	Morris, MN	1961	1990
MN8323	Tracy, MN	1961	1990

**Soil Interpretations**

This group consists of very deep, well drained, medium and moderately fine textured soils formed in calcareous glacial till, drift, and sediments. Permeability is moderately slow to moderate.

<b>Drainage Class:</b>	Well drained	To	Well drained
<b>Permeability Class:</b> (0 - 40 inches)	Moderately slow	To	Moderate
<b>Frost Action Class:</b>	Moderate	To	High

	<b><u>Minimum</u></b>	<b><u>Maximum</u></b>
<b>Depth:</b>	72	
<b>Surface Fragments &gt;3" (% Cover):</b>	0	3
<b>Organic Matter (percent):</b> (surface layer)	1.0	5.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	0	2
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	2
<b>Soil Reaction (1:1) Water (pH):</b> (0 - 12 inches)	7.4	8.4
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	9	12
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	15	28

**Adapted Species List**

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many those

species can be accessed at <http://plants.usda.gov>.

### **Cool Season Grasses**

Green needlegrass	F
Intermediate wheatgrass	F
Meadow brome	F
Newhy hybrid wheatgrass	F
Orchardgrass	F
Pubescent wheatgrass	G
Smooth brome	F
Tall fescue	F
Timothy	F
Western wheatgrass	G

### **Warm Season Grasses**

Big bluestem	G
Indiangrass	F
Little bluestem	G
Prairie sandreed	F
Sideoats grama	G
Switchgrass	F

### **Legumes**

Alfalfa	G
Birdsfoot trefoil	F
Cicer milkvetch	G
Purple prairieclover	G
Red clover	F
White prairieclover	F

G - Good adaptation for forage production on this group of soils in this MLRA

F - Fair adaptation but will not produce at its highest potential

## **Production Estimates**

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

### **Forage Crop**

	<b>Management Intensity</b>	
	<b><u>High</u></b> <b>(lbs/ac)</b>	<b><u>Low</u></b> <b>(lbs/ac)</b>
Alfalfa	8600	4300
Alfalfa/Intermediate wheatgrass	7700	3800
Alfalfa/Smooth brome	7700	3800
Big bluestem	7700	3500
Intermediate wheatgrass	5700	3400
Smooth brome	5400	2900

## Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

**Growth Curve Number:** ND0001  
**Growth Curve Name:** Alfalfa  
**Growth Curve Description:** Alfalfa

### Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	25	30	20	15	5	0	0	0

**Growth Curve Number:** ND0002  
**Growth Curve Name:** Cool season grass  
**Growth Curve Description:** Cool season grass

### Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	40	35	10	5	5	0	0	0

**Growth Curve Number:** ND0003  
**Growth Curve Name:** Warm season grass  
**Growth Curve Description:** Warm season grass

### Percent Production by Month

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	0	10	40	35	15	0	0	0	0

## Soil Limitations

The primary limitation to the soils in this group is the high lime content close to the soil surface. The lime reduces the availability of some plant nutrients. This reduces species choices and yield potential. Also, because most of these are sloping soils on ridges and knobs, they are subject to water and wind erosion, especially when establishing or renovating stands. They also tend to be droughty.

## Management Interpretations

The impact on yields can be reduced by selecting forage species that are tolerant of the high lime levels inherent to these soils. Including sod forming grass species in stands, especially on steeper slopes will reduce the potential for sheet and rill erosion. Incorporate both wind and water erosion control practices during the establishment period. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, and evenly distribute grazing pressure.

## FSG Documentation

### Similar FSGs:

<u>FSG ID</u>	<u>FSG Narrative</u>
G102AY100S	Loamy soils do not have as high a lime content near the surface and are more productive.

## Inventory Data References

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas  
Natural Resources Conservation Service (NRCS) National Water and Climate Center data  
USDA Plant Hardiness Zone Maps  
National Soil Survey Information System (NASIS) for soil surveys in South Dakota and Minnesota counties in MLRA 102A  
South Dakota NRCS SDTG and Minnesota NRCS FOTG  
NRCS National Range and Pasture Handbook  
Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

## State Correlation

This site has been correlated with the following states: Minnesota and South Dakota

## **Forage Suitability Group Approval**

**Original Author:** Tim Nordquist

**Original Date:** 1/28/02

**Approval By:** Dave Schmidt

**Approval Date:** 1/6/03